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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

WATER USE IN THE DELTA COUNTIES OF MISSISSIPPI, 1983

By J. A. Callahan

U.S. GEOLOGICAL SURVEY
WATER-RESOURCES INVESTIGATIONS REPORT 85-4187

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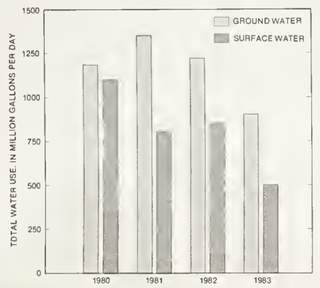
INTRODUCTION

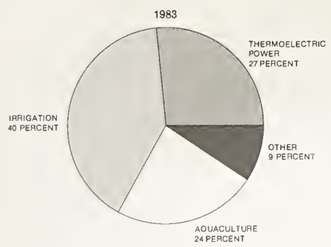
The vast alluvial plain of northwestern Mississippi, commonly called the Delta, comprises an area of about 7,000 square miles (see map) and includes all or parts of 17 counties. Agriculture is the main contributor to the area's economy. Historically cotton and soybeans have been the chief cash crops; however, during the last 10 years rice farming and aquaculture (catfish farming) have shown rapid growth.

In 1983, a total of about 1,400 million gallons of water was used in the Delta each day; this accounted for about 40 percent of Mississippi's total water use. Ninety-eight percent of Mississippi's irrigation and aquaculture occurs in the Delta and of the 898 Mgal/d used for these purposes, 798 Mgal/d was ground water. Almost all ground water used for irrigation is pumped from the underlying shallow alluvial aquifer. The term "water use" as used in this report is equivalent to "water withdrawals".

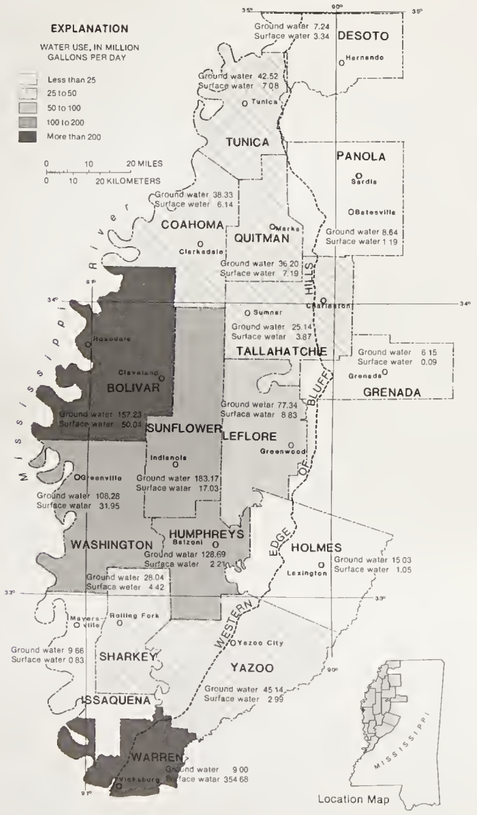
This report, prepared in cooperation with the Mississippi Department of Natural Resources, Bureau of Land and Water Resources, summarizes water use by category and county and examines some variations in water use since 1980. Previous estimates of water use in 5-year intervals since 1950 are available in the USGS Circular series publication, "Estimated use of water in the United States." Now as a result of the National water use information program estimates are available annually.



A TOTAL OF MORE THAN 1,400 MILLION GALLONS OF WATER WAS USED EACH DAY IN 1983.



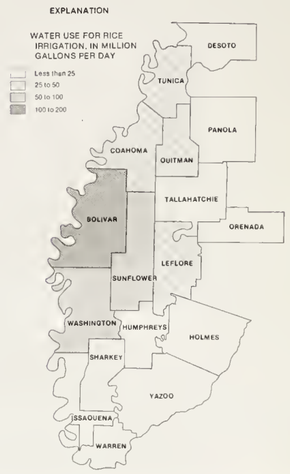
THE THREE PRINCIPAL WATER USES IN 1983 WERE IRRIGATION, THERMOELECTRIC POWER GENERATION AND AQUACULTURE.



TOTAL WATER USE IN THE DELTA COUNTIES OF MISSISSIPPI, 1983.

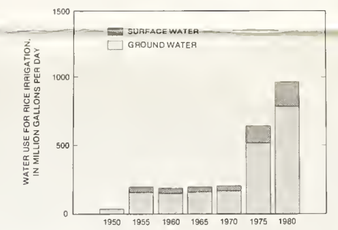
IRRIGATION

Water used for irrigation, by far the largest use of water in the Delta in 1983, exceeded 566 Mgal/d (see table). Most irrigation water was applied to rice. Bolivar County (see map) leads all counties in rice acreage planted and in irrigation water use. Sunflower County was second in 1983.

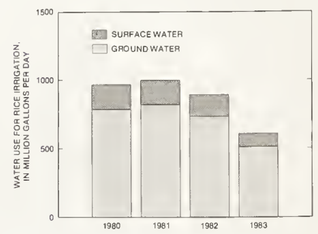


RICE IRRIGATION AMOUNTED TO OVER 300 MGAL/D IN BOLIVAR, SUNFLOWER, AND WASHINGTON COUNTIES.

Water-use studies made at 5-year intervals from 1950 to 1975, showed an average use of about 200 Mgal/d before restrictions on rice acreage were lifted. Acreage increased dramatically in 1975 and reached 246,000 in 1980. Acreage peaked in 1981 at 335,000 and declined to 159,000 in 1983. Changes in water use reflect the annual acreage changes and annual per acre water use. The record high total irrigation use was 1,047 Mgal/d in 1981.



RICE IRRIGATION INCREASED RAPIDLY IN THE LATE 1970's.



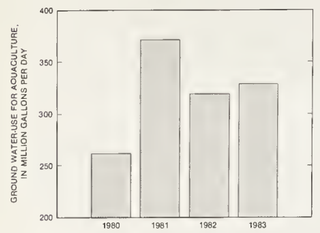
RICE IRRIGATION AVERAGED OVER 500 MGAL/D IN 1983.

AQUACULTURE

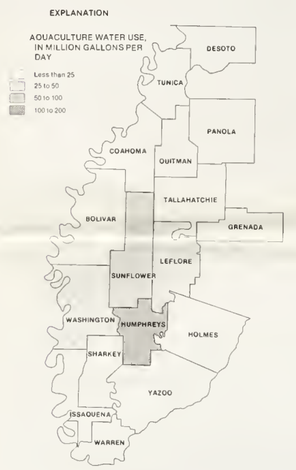
The rapid expansion of aquaculture in the Delta (principally catfish farming) has resulted in a substantial increase in ground-water use in the area. Ground water is the only source used to maintain pond levels for catfish ponds.

In 1981, approximately 54,000 acres of ponds used 376 Mgal/d of ground water. By 1983, pond acreage had increased to over 62,000, but the ground-water withdrawal decreased to about 332 Mgal/d because growers were using water more efficiently.

Water-use estimates are based on data acquired through monitoring representative aquaculture operations in the Delta. Improved management techniques have reduced the water use application rate of water per pond acre from 7.82 ft in 1981 to 6.05 in 1982 and 5.96 in 1983.



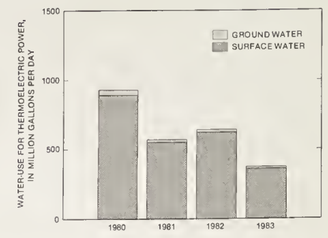
CATFISH PONDS USED MORE THAN 330 MGAL/D OF GROUND WATER IN 1983.



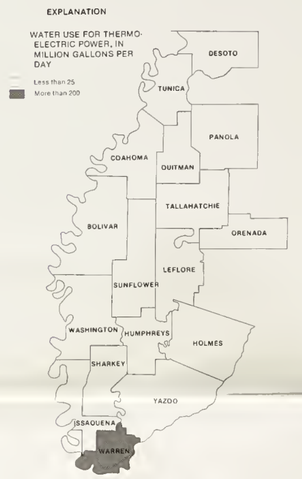
HUMPHREYS AND SUNFLOWER COUNTIES, WHICH WITHDREW 116 AND 81 MGAL/D, RESPECTIVELY, IN 1983, ACCOUNTED FOR 59 PERCENT OF ALL WATER WITHDRAWN FOR AQUACULTURE.

THERMOELECTRIC POWER GENERATION

Thermoelectric power plants are second to irrigation in water use in the Delta. Generating plants are commonly located near major streams, and water is generally used for cooling on a one-time-through basis. The three largest power plants use surface water for cooling and ground water for makeup and boilers. Three smaller power plants use only ground water. The ground-water use at all power plants (total 7 Mgal/d) is small and has shown a decrease since 1980.



SURFACE WATER SOURCES SUPPLIED 370 MGAL/D TO THERMOELECTRIC PLANTS—98 PERCENT OF THE TOTAL NEED.



THERMOELECTRIC POWER GENERATION (330 MGAL/D) WAS THE MAJOR USE OF WATER IN WARREN COUNTY. BOLIVAR AND WASHINGTON COUNTIES WERE MINOR USERS WITH ABOUT 20 MGAL/D EACH.

PUBLIC SUPPLY

The municipal, rural, and private water systems provided 58 Mgal/d (see table) of ground water in 1983. Included in this total are domestic, commercial, industrial, fire, and sanitary uses.

INDUSTRIAL SELF-SUPPLIED

Industrial self-supplied water withdrawals in 1983 from ground-water and surface-water sources amounted to 62 Mgal/d (see table). Although many of these industries are located in municipalities and own a source of water supply, some are also connected to a municipal water system for potable water, sanitary purposes, and fire protection. In some places industrial use is a significant part of the total municipal useage.

OTHER USES

Combined ground-water and surface-water withdrawals for rural self-supply and wildlife impoundments use (see table) accounted for about 13 Mgal/d in 1983.

SELECTED REFERENCES

Callahan, J. A., 1983, Water use in Mississippi, 1980: U.S. Geological Survey Open-File Report 83-224, map, 1 sheet.

Mississippi Department of Agriculture and Commerce, 1982, Mississippi agricultural statistics—1980-1983: Mississippi Department of Agriculture and Commerce, supplement 16, 60 p.

Mississippi Municipal Association, 1981, Mississippi Municipal Directory, 1977-1981: Jackson, Mississippi, 87 p.

Solley, W. B., Chase, E. B., Mann W. B., IV, 1982, Estimated use of water in the United States, 1980: U.S. Geological Survey Circular 1001, 56 p.

U.S. Bureau of Census, 1981, 1980 Census of population and housing: U.S. Department of Commerce, Bureau of the Census PHC80-V-26, Mississippi, 20 p.

To convert English units to International units:

Multiply	By	To obtain
foot (ft)	0.04381	meter (m)
gallon (gal)	3.785	liter (L)
million gallons per day (Mgal/d)	0.4381	cubic meter per second (m^3/s)

WATER USE IN THE DELTA COUNTIES OF MISSISSIPPI, 1983, BY PRINCIPAL USE AND SOURCE (IN MILLION GALLONS PER DAY).

County	Public Supply GW	Rural Self-Supplied Domestic GW	Rural Self-Supplied Livestock GW	Rural Self-Supplied Livestock SW	Industrial Self-Supplied GW	Industrial Self-Supplied SW	Industrial Self-Supplied Total	Thermo-Electric Power GW	Thermo-Electric Power SW	Thermo-Electric Power Total	Aquaculture GW	Rice Irrigation GW	Rice Irrigation SW	Rice Irrigation Total	Other Irrigation GW	Other Irrigation SW	Other Irrigation Total	Wildlife Impoundments GW	Wildlife Impoundments SW	Wildlife Impoundments Total	County Totals GW	County Totals SW	County Totals All Water
Bolivar	5.01	0.32	0.01	0.02	3.12	0.00	3.12	0.43	20.64	21.07	12.83	125.97	27.61	153.58	9.54	1.77	11.31	0.00	0.00	0.00	157.23	50.04	207.27
Coahoma	4.28	.22	.01	.02	1.98	.00	1.98	2.68	.00	2.68	.67	25.04	5.50	30.54	3.45	.62	4.07	.00	.00	.00	38.33	6.14	44.47
DeSoto	4.23	.20	.12	.19	1.62	2.88	4.50	.00	.00	.00	.00	.00	.00	.00	1.07	.27	1.34	.00	.00	.00	7.24	3.34	10.58
Grenada	2.06	.00	.00	.00	4.00	.00	4.00	.00	.00	.00	.00	.00	.00	.00	.09	.00	.09	.00	.09	.09	6.15	.09	6.24
Holmes	2.03	.04	.08	.13	.43	.14	.57	.00	.00	.00	8.09	2.90	.64	3.54	1.46	.14	1.60	.00	.00	.00	15.03	1.05	16.08
Humphreys	.80	.32	.01	.01	.46	.00	.46	.00	.00	.00	116.22	9.75	2.14	11.89	1.13	.06	1.19	.00	.00	.00	128.69	2.21	130.90
Issaquena	.06	.08	.01	.01	.00	.00	.00	.00	.00	.00	5.06	3.69	.81	4.50	.76	.01	.77	.00	.00	.00	9.66	.83	10.49
Leflore	5.82	.41	.01	.02	.72	.00	.72	3.48	.00	3.48	25.75	35.58	7.81	43.39	4.74	.80	5.54	.83	.00	.83	77.34	8.63	85.97
Panola	2.02	.23	.17	.26	.14	.00	.14	.00	.00	.00	1.77	4.22	.93	5.15	.09	.00	.09	.00	.00	.00	8.64	1.19	9.83
Quitman	.76	.31	.01	.01	.42	.00	.42	.00	.00	.00	.32	30.57	6.71	37.28	2.92	.47	3.39	.89	.00	.89	36.20	7.19	43.39
Sharkey	.51	.16	.01	.02	.13	.00	.13	.00	.00	.00	11.91	12.39	2.72	15.11	.44	.07	.51	.49	1.61	2.10	26.04	4.42	30.46
Sunflower	3.96	.36	.03	.05	.00	.00	.00	.00	.00	.00	81.08	74.84	16.43	91.27	2.90	.55	3.45	.00	.00	.00	163.17	17.03	180.20
Tallahatchie	.93	.34	.04	.06	.00	.00	.00	.00	.00	.00	5.96	13.44	2.95	16.39	4.43	.86	5.29	.00	.00	.00	25.14	3.87	29.01
Tunica	.64	.16	.01	.01	.00	.00	.00	.00	.00	.00	9.07	27.41	6.02	33.43	5.23	1.05	6.28	.00	.00	.00	42.52	7.08	49.60
Warren	8.30	.14	.11	.16	.45	24.03	24.48	.00	330.49	330.49	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	9.00	354.68	363.68
Washington	9.69	.69	.02	.03	6.29	.00	6.29	.24	19.32	19.56	30.88	50.07	10.99	61.06	7.55	1.61	9.16	.85	.00	.85	106.28	31.95	138.23
Yazoo	2.72	.10	.18	.26	15.26	.00	15.26	.10	.00	.10	22.29	4.22	.93	5.15	.27	.01	.28	.00	1.79	1.79	45.14	2.99	48.13
Total	53.82	4.08	.83	1.26	35.02	27.05	62.07	6.93	370.45	377.38	331.90	420.09	92.19	512.28	46.07	8.29	54.36	3.06	3.49	6.55	901.80	502.73	1,404.53

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